Jan. 24, 1928. 1,657,072

D. A. DOUGHERTY

APPARATUS FOR CLEANING CONTAINERS

Original Filed April 13, 1925 3 Sheets-Sheet 1

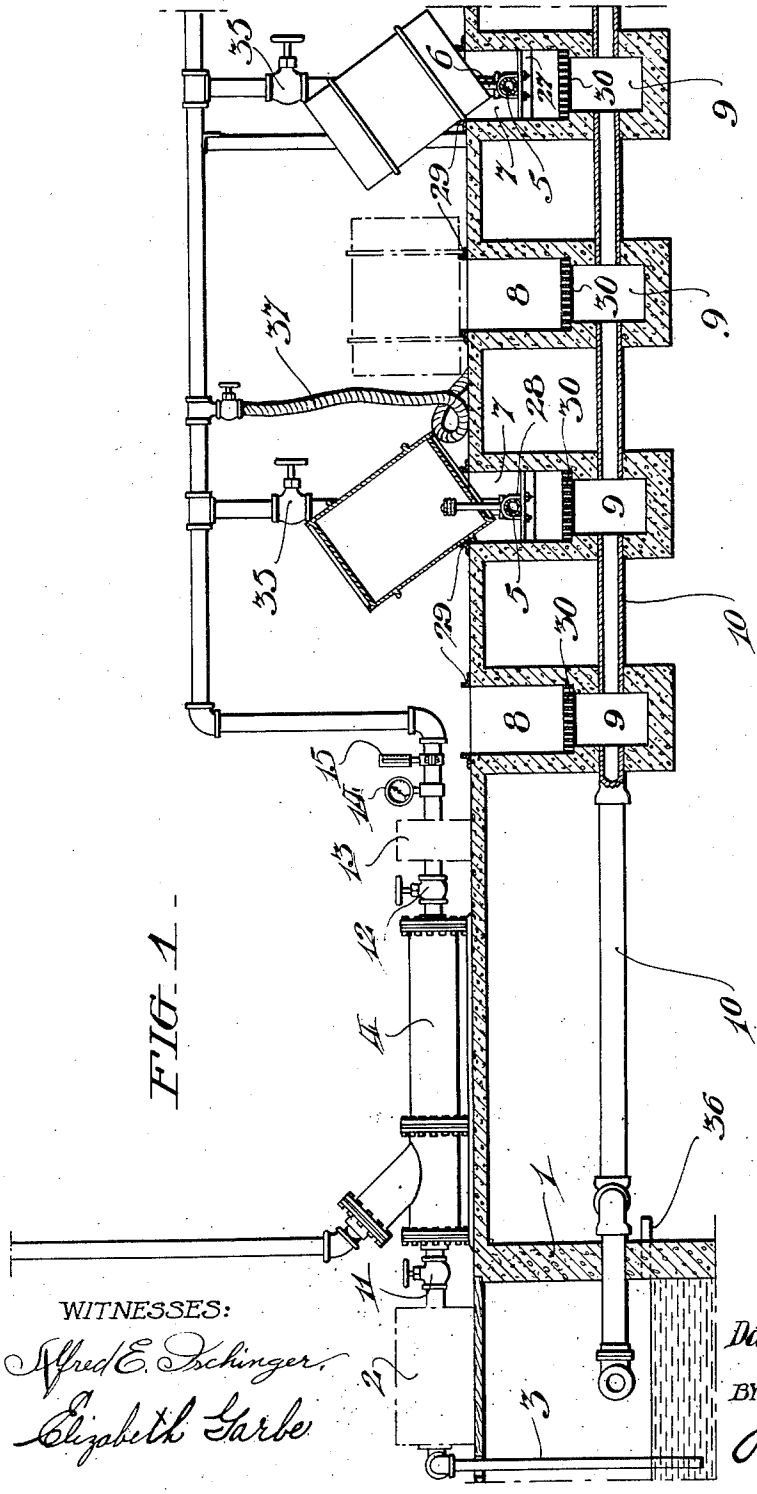


FIG. 1.

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APPARATUS FOR CLEANING CONTAINERS

Original Filed April 13, 1925 3 Sheets-Sheet 2

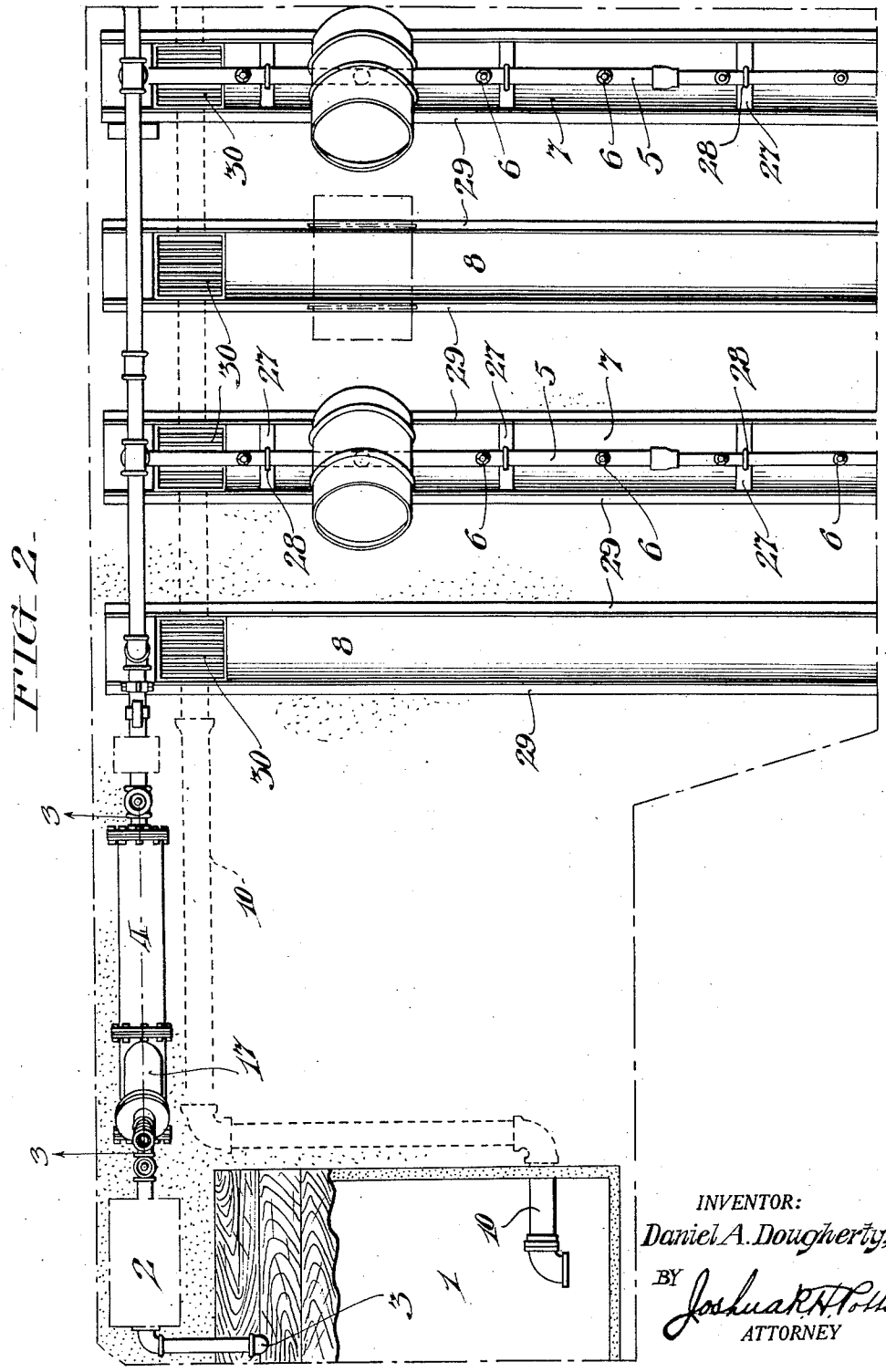


FIG. 2.

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FIG. 3.

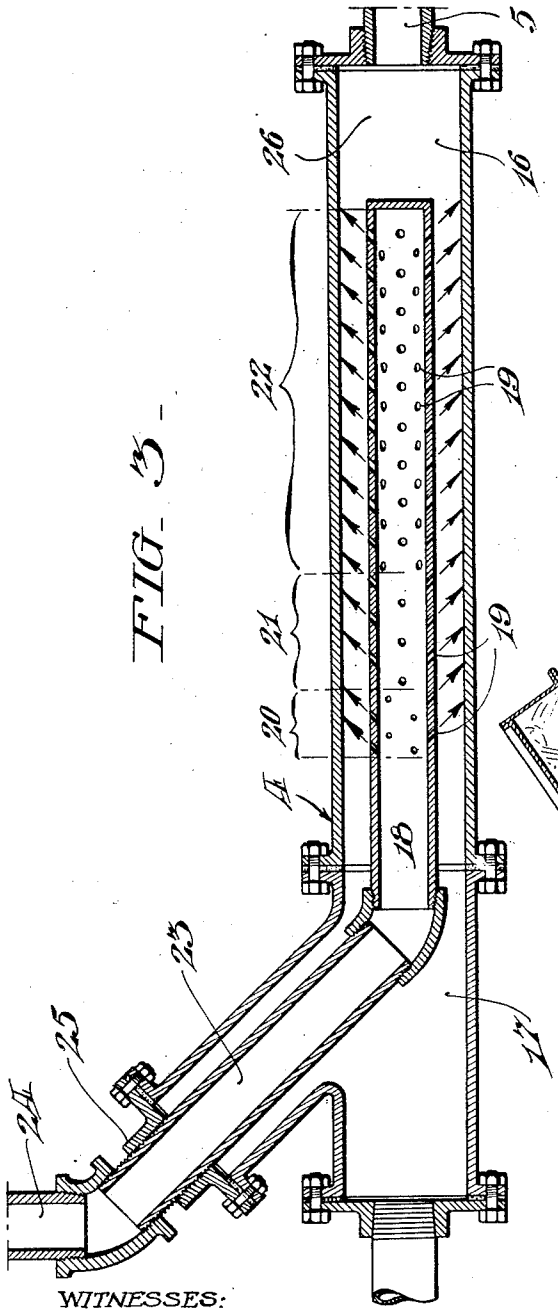
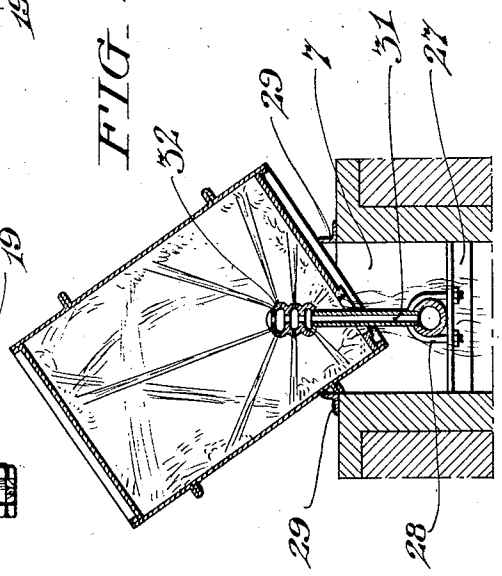


FIG. 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CLEANING CONTAINERS.

Original application filed April 13, 1925, Serial No. 22,575. Divided and this application filed November 26, 1926. Serial No. 150,997.

My invention relates to apparatus for cleaning containers, such as barrels, drums and milk cans and more particularly to the apparatus described in my application for Letters Patent on method for cleaning containers of which this application is a division.

The usual method requires use of steam, water and a cleaning compound, and various operations in different sequences to suit the particular type of containers.

The chief objection to these methods is that the use of a cleaning compound, the waste of the water used in rinsing, the generation and maintenance of the steam, and the several operations required, make them slow and costly.

The objects of my invention are to provide apparatus by which containers may be cleaned and rinsed in one operation without use of a cleaning compound; by which the cleaning water may be heated with a small quantity of heat, and by which waste of cleaning and rinsing water is eliminated.

These objects, and other advantageous ends which will be described hereinafter, I attain in the following manner, reference being had to the accompanying drawings in which

Figure 1 is a central section, partly diagrammatic, of apparatus made in accordance with my invention,

Figure 2 a plan view of the apparatus shown in Figure 1,

Figure 3 an enlarged fragmentary section taken on line 3—3 of Figure 2,

Figure 4 an enlarged view of the container shown in Figure 1, illustrating the action of the water thereon.

Referring to the drawings, 1 indicates a well; 2 a suitable pump, diagrammatically illustrated, connected to the well by a pipe 3 for lifting the water from the well; 4 a heater connected with the pump; 5 horizontal water pipes connected with the heater; 6 upright nozzles connected with the horizontal water pipes; 7 troughs in which the nozzles and water pipes are mounted and hereinafter called nozzle troughs; 8 troughs above which the containers are conveyed for draining the liquid therefrom, hereinafter called container troughs; 9 drain traps in the troughs for receiving water from the troughs, and 10 a pipe line connecting the drain traps with each other and with the well. A suitable check valve 11, a controlling valve 12, a strainer 13, a gage 14, and a thermometer 15, are connected to the apparatus to efficiently control the same.

Heater 4 consists of a tubular casing 16 having a Y casting 17 connected thereto. A steam pipe 18 is disposed concentrically in casing 16 and has perforations 19 inclined to the axis of the pipe and leading forwardly and outwardly. The perforations increase in size toward the forward end of the pipe. In actual practice I have obtained good results by making a group of perforations, 20, $\frac{1}{8}$ of an inch in diameter, a group, 21, $\frac{3}{16}$ of an inch in diameter and a group, 22, $\frac{1}{4}$ of an inch in diameter. Perforated pipe 18 is connected by an elbow and a pipe 23 with a steam line 24 and casting 17. The connection to one branch of the Y-casting is made by threading pipe 23 to a flange 25 secured to the branch. The other branch of the casting is connected with the water line leading to the pump. The discharge end 26 of the heater casing is connected with the water line 5 leading to the nozzles.

Nozzle troughs 7 are provided with cross bars 27 to which pipes 5 are clamped by U-shaped bolts 28. Angle bars 29 are secured at opposite sides of troughs 7 and 8 to reinforce the corners and serve to support the containers while being cleaned or rolled to the cleaning position. Drain traps 9 are preferably disposed near the end of the trough. A strainer 30 is placed over each drain trap to prevent solid matter from passing therein. The drain traps are connected to each other by pipe line 10.

Each nozzle is preferably made up of a pipe 31 and a series of pipe sections 32. The pipe sections are threaded one within the other and each has perforations arranged at a different angle. The perforations of the upper section lead upwardly and outwardly, those of the middle section lead sideways and those of the lower section lead downwardly and outwardly. Arranging the perforations in this manner causes the water jets to issue therefrom at different angles and be deflected against the sides of the container as indicated in Figure 4. This action loosens and washes away the foul matter from the interior of the container.

To clean a container, it is rolled on angle bars 29 of the container trough 8 to the position adjacent a nozzle 6. It is then placed in trough 7 with the nozzle extending within the container through its opening. The water is then turned on by opening valve 35. Water raised from the low level of well 1 is placed under pressure by pump 2 and heated in heater 4 by steam passing out of the perforations 19 into the water. Making the perforations small and increasing in size toward the forward end of the pipe largely eliminates the rattling noise usually present in heaters of this type. This is due to the small amount of steam passed through the group of perforations 20 to slightly heat the water before it passes the group of perforations 21. This group allows more steam to pass into the water to raise its temperature before it reaches the group of perforations 22. The water is raised to such temperature at this point that the amount of steam passing through perforations 22 will not cause a loud rattling noise. Inclining the perforations in the direction of the flow of the water causes the steam to assist the flow and increase the velocity of the water. The flow of steam and water is so regulated that the water will be heated to a temperature not exceeding its boiling point under the pressure. After the water is heated, it passes under pressure through pipe 5 and out of the perforations in nozzle 6. The interior of the container being under atmospheric pressure, which is lower than the pressure of the water in the heater, causes the heat in the water to change a part of the water into steam. The steam loosens the foul matter and the water carries it out of the container. The jets of steam and water issuing from the lower pipe section of the nozzle, agitate the water and foul matter at the bottom of the container so that the foul matter is carried away with the water. The water and foul matter are drained from the trough into trap 9 and from the trap through pipe 10 to the low level of well 1. If the foul matter is oil it may be reclaimed by draining it off through an overflow pipe 36 in the well. The water may thus be kept clean and used again.

After the container is cleaned the water is shut off and the container removed from the nozzle and placed on angle bars 29 of container trough 8. The outside of the container is then cleaned by a hose 37 connected to any part of the pipe line for receiving the hot water under pressure. The action of the hot water on the foul matter on the outside of the drum is similar to the action on the foul matter on the inside. After the outside of the container is cleaned, any water remaining in it is removed. The container is then dried by blowing heated air into the container in any suitable manner, such as by placing the containers over upright hot air pipes arranged like the nozzles 6 or by blowing the hot air into the container with a hose similar to the hose 37. The container being heated by the hot water while cleaned, greatly assists the drying action and shortens the time for drying.

With the apparatus above described, containers may be quickly cleaned without the use of cleaning compounds and without costly maintenance and generation of steam since the hot water after performing its cleaning function returns to the well to be used again.

While I have described my invention as taking a particular form, it will be understood that the various parts may be changed without departing from the spirit thereof, and hence I do not limit myself to the precise construction set forth, but consider that I am at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:—

1. Apparatus for cleaning containers consisting of a well; a pump connected for lifting water from the well and placing it under pressure; a heater connected with the pump for heating the water under pressure; a water pipe connected with the heater; upright nozzles connected with the pipe; a trough beneath the pipe; a drain trap in the trough, and a drain pipe connecting the trap with the well.

2. Apparatus for cleaning containers consisting of a well; a pump for lifting the water from the well and placing it under pressure; a heater casing connected with the pump; a heater for heating the water under pressure in said casing; a water pipe connected with the heater casing; nozzles connected with the pipe; a trough beneath said pipe; a drain trap in the trough, and a drain connecting the trap with the well.

3. Apparatus for cleaning containers consisting of a well; a pump for lifting the water from the well and placing it under pressure; a tubular heater casing connected with the pump; a heater for heating the water under pressure in said casing; a water pipe connected with the heater casing; nozzles connected with the pipe for discharging the water, and means for draining the water back into the well.

In testimony whereof I have signed my name to this specification.

DANIEL A. DOUGHERTY.